



A slurry product fit for every application

MechChem Africa talks to Marnus Koorts, product manager for the slurry product range at Weir Minerals Africa, about fit-for-application solutions and the role Weir Minerals can play in optimising the performance and life of processing plants by selecting the best possible component combination for every application.

In spite of ongoing constraints in the mining industry, Marnus Koorts believes that Weir Minerals Africa is well placed to support its customers. “In general, we are hedged against downturns by our excellent branch infrastructure and our focus on holistic solutions. Irrespective of whether the mining market is growing or not, maintenance is an essential ongoing requirement and we are actively implementing strategies to help people manage the maintenance of their assets to extend wear life and reduce costs,” he says.

In the mining industry, says Koorts, Weir Minerals has always strived to assess the mines’ entire processing circuit to maximise the uptime of the whole plant. “One has to look at a system as a combination of essential components rather than as a series of isolated ones,” he explains. “Every piece in the chain must be looked after: the mill feed passes into the mill pump, is pumped through pipes into a cyclone and onto a screen. By changing any one of these circuit components, all of the others will be affected. Weir Minerals realised very early on that it could not offer customers lasting solutions without looking at the system as a whole,” Koorts tells MechChem Africa.

The approach has driven acquisitions,

including crushing specialist, Trio®, which extended the company’s already comprehensive mining offering. “This gives us a system-wide presence that enables us to install individual pieces of equipment that slot perfectly into a circuit without any negative effects on other parts of the process,” says Koorts.

Describing how the approach works at a mine’s minerals processing plant, he says that every milling circuit is different. “Pumps are fundamental slurry handling components in minerals processing plants, but every pump in the circuit has to be designed, sized and optimised to match the mineral feed, mineral type and all of the other surrounding circuit components,” he points out.

“While we have an unparalleled range of slurry pumps at our disposal, we no longer see ourselves as a pumps company. We offer system wide slurry handling solutions, from mill circuit pumps to cyclones, screens, valves, hoses, spools and liners.

“At the end of the day, one can’t be a specialist in any of these products without understanding the whole system. We service an extensive installed base handling different minerals at different mines and as a result, we know and have learned where the problems and bottleneck areas are.

“Many suppliers will only focus on manu-

facturing spares for pumps, or they specialise in one type of pump: vertical spindle pumps or process pumps or mill pumps, for example. All types are important to our mining customers, and if the understanding of the subtle differences between pumps is lacking, customers may end up losing a lot of money,” Koorts suggests.

Explaining further, he boasts that mill circuit pumps such as Weir Minerals’ Warman® MCR® are designed to be larger than competitors’ pumps, in order to turn a lot slower and reduce wear rates. On the other end of the spectrum, clearwater process pumps can be made smaller, which results in them having to turn a lot faster to do the same duty. This is beneficial from a capital cost point of view and does not have negative effects on wear as these are pumping less abrasive material.

“On the large mill circuit pumps, maintenance and electricity are critical – large pumps can cost tens of millions of Rands to run, which amounts to more than the capital value of the pump. A larger pump, although more capital intensive up front, has a significantly lower operational cost, and is far more cost effective in terms of R/ton costs,” he argues.

“For every application, individual pump and every piece of connected equipment we focus on energy efficiency, product through-

put, the cost of maintenance and the reduction of downtime,” he says, adding “efficiency, longevity and the reduction of spares, is the game we are in.”

The same approach applies to the company’s valves offering, Koorts continues: “Every valve choice must match the application requirements, but the importance of this is understated in mining circles. Valves are treated as commodities. We regularly see ‘valve graveyards’ with heaps of used valves, because it is acceptable practice to remove and replace a valve as soon as it leaks.

“We believe valves should help the whole system to run more safely and for longer periods between shutdowns, which is why our valves are maintainable. Our Isogate knife gate valves, for example, are designed for a longer knife and seal life, and we can quickly replace the rubber seals, which typically last for over a year. This is a lot more cost effective than installing a commodity valve and replacing it every three to six months. Once again, life of mine and total cost of ownership come into play and we urge operators to adopt our approach instead of feeling trapped into routine replacement cycles,” he says.

Koorts also points to Weir Minerals’ Delta Industrial™ severe duty knife gate valves, which use a metal-to-metal seal. “These are used in very aggressive environments such as acid leach slurries, and operators do not want these to leak because the concentrate contains valuable product,” he informs MechChem Africa.

The metal-on-metal seals last well in these applications because tough and corrosion-resistant materials, such as duplex steels, have been chosen for the knife seat and sealing components.

“The pressure under which these valve seals operate means that they can split any rock in their way and still ensure the integrity of the seal. Additionally, from a maintenance perspective, the only component needing any attention is the knife itself,” says Koorts.

Going back to the pumps needed for leach and thickener applications, he says that Warman® AH® pumps with stainless steel and other wet-end impellers and bushes are widely used. “These pumps are typically much smaller than mill discharge pumps and they can run faster because they transfer semi-processed materials at lower volumes. In terms of wear, acidity and corrosion are the problems rather than abrasion, so materials are needed to cater for this,” he says.

“Underneath a thickener, we typically use our Warman AHF pumps to cater for thickened underflow or the froth that overflows from flotation cells. The latter usually contains the high value concentrate but the froth is full of air, which makes it very difficult to pump. Our AHF® pumps have self-inducing vanes that draw in the froth and compress it to remove the air volume, which makes it easier to pump.

“In addition, we offer an add-on technology called AHF CARS (continuous air removal system) which further helps to remove air without extracting any high value liquids, creating the liquid concentrate stream needed further down the line,” he says. “Removing the air also reduces the volume, so a much smaller pump can be used,” he adds.

Other valves for different parts of a processing circuit: pinch valves, pneumatic valves, auto-ball and butterfly valves also form part of the offering. “Our auto-ball valves are required whenever a standby pump is installed. This valve sits between two pump outlets in a Y-configuration with the valve outlet connecting into the process pipeline. The valve ball blocks the outlet of the standby pump. When the pumps are switched over, the ball is pushed off its seat by the fluid flow from the standby, blocking the outlet of the other pump instead,” he explains.

“A right-sized ball valve with comparable wear characteristics to the pump is necessary wherever a standby is installed to avoid a total shutdown of the feedline should the duty pump break down,” Koorts adds.

“The choice of liners and design for each component choice depends on a host of different factors, the nature of the ore, the pH of the slurry, and particle size. Large particles from a primary mill for example, will cause more impact wear, which makes rubber lining preferable because it can absorb a significant percentage of the impact energy. Our Warman MCR mill circuit pumps – rubber lined with Linatex premium rubber – are therefore widely preferred for primary mill discharge duty,” he says.

“For every specific application, however, it is important to look for the specific pump or valve or cyclone that will perform best. At Weir Minerals we have a huge range of equipment, material and construction types, which enables us to supply whole solutions that are more reliable and less costly to operate. In the end, this approach leads to the lowest possible overall costs per ton and, therefore, maximum profitability,” Koorts concludes. □



A Warman MCR 450 pump installed in the secondary mill discharge circuit of a platinum mine.



A Cavex 500CVXT hydrocyclone cluster installed at a coal mine in Mpumalanga, South Africa.



Isogate knife gate valves installed in a coal operation.